Using LaTeX on the Sun

Leslie Lamport

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For LaTeX Version 2.09

Contents

LaTeX runs on a variety of computers at many different sites. This document tells you how to use LaTeX on the Sun workstations at the S. U. Computer Science Department. It is not about LaTeX itself, which is described by the manual—*LaTeX: A Document Preparation System*, published by Addison-Wesley, available at fine book stores everywhere.

If you have a question that you can't answer by reading the manual and this document, ask Steve Leonard or Peter Crockett.

1 Getting Started

1.1 Running a Sample File

Before preparing your own documents, you may want to get acquainted with LaTeX by running it on a sample input file. First make your own copy of the file `sample.tex` by typing the following SunOS command:

```
cp /usr/local/doc/tex/sample.tex .
```

(You must type the space followed by the period at the end. This and all other SunOS commands are ended by typing *return*.) A copy of the file `sample.tex` is now in your current directory; you can edit it just like any other file. If you destroy or mess up your copy, typing the above command again gets you a fresh one.

Next, run LaTeX on the file `sample.tex` by typing:

```
latex sample
```

When LaTeX has finished, it will have produced the file `sample.dvi` in your directory. You can print this file by typing the command

```
dvitops -Plw sample.dvi
```

The output will be produced on the default LaserWriter for your location.

After your output has been printed, you can delete `sample.dvi` by typing

```
rm sample.dvi
```

1.2 Preparing and Running LaTeX on Your Own Files

You must use a text editor to prepare an input file for LaTeX. The vi and emacs editors are the most used and are described in the on-line man pages. The easiest way to start learning about LaTeX is by examining the file `small.tex` with your text editor. You can obtain your own copy of this file, in your directory, by typing the command

```
cp /usr/local/doc/tex/small.tex .
```

After you have prepared your file, whose name should have the extension `tex`, you must run it through LaTeX and print the output. Follow the instructions in Section 1.1, except substitute the first name of your file for "`sample`". Remember to save disk space by deleting the `dvi` file after printing the output.

If you want to stop LaTeX in the middle of its execution, perhaps because it is printing a seemingly unending string of uninformative error messages, type *Control-C* (press *C* while holding down the key labeled *CTRL*). This will make LaTeX stop as if it had encountered an ordinary error, and you can return to SunOS command level by typing `X`, as described in the manual. If typing *Control-C* doesn't work, typing *Control-Z* will get you immediately to command level, but this will leave a stopped job hanging around. A stopped job won't hurt anything and will disappear when you log out, but it forces you to type two successive `logout` commands to log out.

To use the *spell* program for finding spelling errors in a LaTeX input file named `myfile.tex`, type the following command:

```
detex myfile.tex | spell
```

This will type a list of possibly misspelled words on your terminal. If you'd rather have the output written to a file named `foo.bar`, type

```
detex myfile.tex | spell >foo.bar
```

2 Carrying On

2.1 LaTeX on the Sun

The only special problems in using LaTeX caused by the SunOS operating system involve the way it handles files. The first problem arises because, when a program starts to write a file, the system destroys the previous version of that file. Thus, if an error forces you to stop LaTeX prematurely (by typing *Control-C* or *Control-Z*), then the files that LaTeX was writing are incomplete, and the previous complete versions have been destroyed. You probably don't care about the output on the `dvi` file, but, if you are making a table of contents or using cross-referencing commands, then LaTeX also writes one or more *auxiliary files* that it reads the next time it processes the same input file. If the auxiliary files are incomplete because LaTeX was stopped before reaching the end of its input file, then the table of contents and cross-references will be incorrect the next time LaTeX is run on the same input file. You will have to run LaTeX a second time to get them right. If you want to avoid having to run LaTeX twice after making an error—for example, if your input is very long—then you should save copies of these auxiliary files before running LaTeX. An input file named `myfile.tex` and all the auxiliary files produced by LaTeX from it are included in the file specifier `myfile.*`. Use the `cp` command to save copies of these files.

The second problem in using LaTeX on the Sun involves the files that LaTeX reads. The file whose name you type with the `latex` command is called the *root file*. In addition to reading the root file, LaTeX also reads the files specified by `\input` and `\include` commands. With the SunOS directory system, LaTeX must know not only the names of these files but also on what directories they are. It will have no problem finding the correct files if you follow two simple rules:

1. Run LaTeX from the directory containing the root file.
2. Keep all files specified by `\input` and `\include` commands in the same directory as the root file.

If you follow these rules, you never have to type a path specifier when using LaTeX.

You should never break the first rule, otherwise LaTeX will have trouble finding auxiliary files. (To run LaTeX on someone else's file, copy the file to your directory.) If you break the second rule, specifying a file from another directory in an `\input` or `\include` command, you must use a complete path name. For example, to include the file `hisfile.tex` from Jones' directory `/foo/bar`, you can type

```
\include{/home/fac/jones/foo/bar/hisfile}
```

A `~` character may not appear in the argument of an `\input` or `\include` command, so you *can't* use a file name such as `~jones/foo/bar/hisfile`.

For people who don't like to obey rules, here is exactly how LaTeX finds its files. The root file is found by the operating system according to its usual rules. LaTeX's auxiliary files are read and written in the directory from which it is run. All file names specified in the LaTeX input, including the names of document-style (`sty`) files specified by the `\documentstyle` command, are interpreted relative to the directory from which LaTeX is run. If LaTeX does not find a file starting in this directory, it looks in the system directory `/usr/local/lib/tex/inputs`. You can change the directories in which LaTeX looks for its input files by setting the environment variable `TEXINPUTS`. Putting the command

```
setenv TEXINPUTS :.:/home/fac/jones/myown:/usr/local/lib/tex/inputs:
```

in your `.login` file causes LaTeX to look for files first in the current directory, then in Jones' `/myown` directory, and then in the system directory. You might want to do this if your name is Jones and you have your own personal document-style files in your `/myown` directory.

2.2 Document Styles

There are a number of document styles and style options available that are not described in the manual: the `proc` style option for making camera-ready copy for conference proceedings, the `bezier` option for drawing curves, the `ifthen` option for implementing **if-then-else** and **while-do** control structures, the `res` and `resume` styles for making resumes, the `showidx` option for printing index entries in the margin, the `makeidx` option for use with the *MakeIndex* program (coming soon), and the `epic/eepic` trio for producing diagrams. The `epic/eepic` group is discussed in the document "latexpictures", which can be found in this directory; the remaining style options are described below.

2.2.1 The `proc` Style Option

The `proc` option is used with the `article` document style. It produces two-column output for ACM and IEEE conference proceedings. The command `\copyrightspace` makes the blank space at the bottom of the first column of the first page, where the proceedings editor will insert a copyright notice. This command works by producing a blank footnote, so it is placed in the text of the first column. It must go after any `\footnote` command that generates a footnote in that column.

LaTeX automatically numbers the output pages. It's a good idea to identify the paper on each page of output. Placing the command

```
\markright{Jones---Foo}
```

in the preamble (before the `\begin{document}` command) prints "Jones—Foo" at the bottom of each page.

2.2.2 The `bezier` Style Option

This option defines a single command, `\bezier`, that draws a curved line in a `picture` environment. Let P_i be the point with coordinates (x_i, y_i), for $i = 1$, 2, and 3. The command

`\bezier{`n`}(`x_1`,`y_1`)(`x_2`,`y_2`)(`x_3`,`y_3`)`

draws n points on the quadratic Bezier spline determined by the three points P_1, P_2, and P_3. The locus of points on this spline is a parabolic arc from P_1 to P_3 having the line P_1P_2 tangent to it at P_1 and the line P_2P_3 tangent to it at P_3. Note that P_2 is *not* on this arc unless P_1, P_2, and P_3 are colinear, in which case the arc is a straight line. Bezier splines are useful because it's easy to join two of them together smoothly by giving them the same tangent line where they meet.

It takes roughly 75 points per inch to form a solid line, depending upon the line thickness. See Section C.13.3 of the manual for commands to specify line thickness in a `picture` environment. This command is *very* slow, and TeX has enough memory to hold only about 1000 points plus a page of text. (Remember that TeX keeps the current page plus all as yet unprinted figures in memory.) So, the `bezier` command should be used for only a small number of small curves.

2.2.3 The `ifthen` Style Option

This option provides two programming language features that are useful only for people who already know how to program. It defines the two commands

> `\ifthenelse{`*test*`}{`*then clause*`}{`*else clause*`}`
> `\whiledo{`*test*`}{`*do clause*`}`

that implement the following two Pascal language structures

> **if** *test* **then** *then clause*
> **else** *else clause*
> **while** *test* **do** *do clause*

The *then*, *else*, and *do* clauses are ordinary LaTeX input; *test* is one of the following:

- A relation between two numbers formed with `<`, `>`, or `=`; for example, `\value{page}>3`.
- `\equal{`*string1*`}{`*string2*`}`, which evaluates to *true* if *string1* and *string2* are the same strings of characters after all commands have been replaced by their definitions. (Upper- and lowercase letters are unequal.)
- A logical combination of the above two kinds of tests using the operators `\or`, `\and`, and `\not` and the parentheses `\(` and `\)`—for example:

```
\not \( \value{section} = 1  \and  \equal{Jones}{\myname} \)
```

The *test* argument is a violently moving argument, which means that not only fragile commands but even some commands that are not normally fragile will break, causing TeX to enter an infinite loop. The `\protect` command works in these situations.

These commands, together with `\renewcommand` and the commands of Section C.7.4 for manipulating counters, open up a whole new world of hacking.

2.2.4 The `showidx` Style Option

This style option, for use with the `report` or `book` document styles, causes index entries to be printed in the outer margin. It does not change the effect of `\makeindex`, which controls whether or not an `.idx` file is written. No attempt is made to avoid overprinting marginal notes. This option issues a `\flushbottom` declaration.

2.3 Where the Files Are

All LaTeX files mentioned in the manual, including the `sty` and `doc` files, are in the directory `/usr/local/lib/tex/inputs`. The files `sample.tex` and `small.tex` can also be found in the directory that contains the Local Guide (this document). Fonts are stored in two directories: the `tfm` files used by TeX are on `/usr/local/lib/tex/fonts`, and the pixel files used by *dvitops* and other device drivers are in the sub-directories of `/usr/local/lib/tex/fonts`.

2.4 Running `lablst.tex` and `idx.tex`

A list of labels and citations in an input file is printed by running LaTeX on the input file `lablst.tex`, which is done by typing

```
latex /usr/local/lib/tex/inputs/lablst
```

LaTeX will then ask for the name of the input file, which should be typed without an extension, and for the name of the main document style (e.g., `article`), used by that file.

The index entries on an `idx` file are printed by running LaTeX on the file `idx.tex`, which is done by typing

```
latex /usr/local/lib/tex/inputs/idx
```

LaTeX will ask for the name of the `idx` file, which is typed without an extension.

2.5 Differences from the Manual

All LaTeX features described in the manual are provided by the implementation at S.U.'s CIS Department.

2.6 Using BibTeX

BibTeX is a program for compiling a reference list for a document from a bibliographic database. It is run by typing

```
bibtex myfile
```

where `myfile.tex` is the name of your LaTeX input file. This reads the file `myfile.aux`, which was generated when you ran LaTeX on `myfile.tex`, and produces the file `myfile.bbl`. BibTeX should be run from the directory containing `myfile.tex` (which should be the same directory from which LaTeX was run on that file).

If the `bib` file is not in the same directory as the LaTeX input file—for example, if you're using someone else's `bib` file—then you must include a path as part of the file name specified by the `\bibliography` command. A `~` cannot appear in the argument of a `\bibliography` command, so you should use a complete path name. For example, the LaTeX command

```
\bibliography{/home/fac/jones/bibfiles/gnus}
```

specifies the file `gnus.bib` kept by Jones in his `/bibfiles` directory.

There is now no formal provision for sharing bibliographic database information, nor are there programs to assist in making your own `bib` files. Suggestions for forming one or more common `bib` files are welcome.

2.7 Using SliTeX

SliTeX is a version of LaTeX for making slides. To run SliTeX with a root file `myroot.tex`, you type

```
slitex myroot
```

(You should be connected to the directory containing `myroot.tex`.) Refer to Section 2.1 if you want slide files or `\input` files to be in a different directory from your root file.

Color slides are made by copying the color layers produced by SliTeX onto color transparencies.

2.8 Fonts

Almost all the symbols available on our fonts can be generated by ordinary LaTeX commands. However, there are type sizes not obtainable by LaTeX's size-changing commands with the ordinary document styles. Consult a local TeX expert to find the TeX name for such a font.

Tables 1 and 2 allow you to determine if the font for a type style at a particular size is preloaded, loaded on demand, or unavailable.

Table 1 tells you what size of type is used for each LaTeX type-size command in the various document-style options. For example, with the `12pt` option, the `\large` declaration causes LaTeX to use 14pt type. Table 2 tells, for every type size, to which class of fonts each type style belongs. For example, in 14pt type, `\bf` uses a preloaded font and the other five type-style commands use load-on-demand fonts. Roman (`\rm`) and math italic (`\mit`) fonts are all preloaded; the `\em` declaration uses either italic (`\it`) or roman.

Some special fonts that are available include the Cyrillic and math symbols from the AMS.

2.9 Special Versions

No foreign-language or other special versions of LaTeX are currently available.

size	default (10pt)	11pt option	12pt option
`\tiny`	5pt	6pt	6pt
`\scriptsize`	7pt	8pt	8pt
`\footnotesize`	8pt	9pt	10pt
`\small`	9pt	10pt	11pt
`\normalsize`	10pt	11pt	12pt
`\large`	12pt	12pt	14pt
`\Large`	14pt	14pt	17pt
`\LARGE`	17pt	17pt	20pt
`\huge`	20pt	20pt	25pt
`\Huge`	25pt	25pt	25pt

Table 1: Type sizes for LaTeX size-changing commands.

	`\it`	`\bf`	`\sl`	`\sf`	`\sc`	`\tt`
5pt	D	D	X	X	X	X
6pt	X	D	X	X	X	X
7pt	P	D	X	X	X	X
8pt	P	D	D	D	D	D
9pt	P	P	D	D	D	P
10pt	P	P	P	P	D	P
11pt	P	P	P	P	D	P
12pt	P	P	P	P	D	P
14pt	D	P	D	D	D	D
17pt	D	P	D	D	D	D
20pt	D	D	D	D	D	D
25pt	X	D	X	X	X	X

Table 2: Font classes: P = preloaded, D = loaded on demand, X = unavailable.

3 Bugs

There are a few known bugs in LaTeX that occur very seldom and cause the user little trouble, but would be very difficult to fix. Moreover, given the nature of complex systems, it is not unlikely that the corrections would lead to even worse problems. Therefore, these bugs will probably not be fixed.

The bugs and ways to get around them are listed below. Do not worry about any of them until you are preparing the final draft, since changes to the text are very likely to cause the problem to disappear.

- In rare instances, a figure or table will be printed on the page preceding the text where the `figure` or `table` environment appears. This can be fixed by moving the environment further towards the end of the document.
- A marginal note at the top of a page may appear in the wrong margin. This can be fixed by inserting a redundant `\pagebreak` command to force a page break exactly where LaTeX started the new page anyway.
- A footnote can be broken across two pages when it should fit on a single page. This happens when there is one or more figures or tables on the page. The problem is corrected by moving, towards the end of the file, the last `figure` or `table` environment that produces a figure or table on the page where the footnote starts.

4 Errata and Additions to the Manual

These are all the errors and omissions to the manual, LaTeX: *A Document Preparation System* reported by 13 April 1988.

4.1 First Four Printings

The following errors were corrected in the Fourth Printing. To see if your copy is one of the first three printings, turn to the copyright page—the one with the Library of Congress cataloging information, on the back of the title page. If the fifth line on that page begins "that, as of August 27, 1985", then your copy is from the first three printings.

page xiii

Add Mike Urban to the list of people thanked in the third paragraph.

page 2

In the first paragraph of Section 1.1, replace the three instances of `sample.tex` by `small.tex`.

page 15, line 18

Replace "thay" by "that".

page 24, line 13

Add a period to the end of the line.

page 31, line 7

Delete one "will".

page 39, line 2

Change "six" to "five".

page 39, line 17

Remove the extra "it".

page 40, line -8

Change "five" to "six".

Section 3.3.5, page 49

The name of the environment is `eqnarray`. There are two instances on this page of the incorrect name "`eqnarry`" that should be changed.

page 52, last line

Replace "instead of $\int\int y dx dy$" by "instead of $\int\int z dx dy$".

pages 55–58, 124, and 173–174

Commands that define or redefine a command or environment, such as the `\newcommand` and `\renewenvironment` commands, should not be nested within one another. Doing so may result in the following TEX error:

```
! Illegal parameter number in definition of ... .
```

page 56, line -3

Change "`{\bf x}`" to "`{x}`".

page 60, line -7

Replace "one of these environments" by "a `figure` or `table` environment".

page 74, line 20

Change `\begin{documentstyle}` to `\begin{document}`.

page 75, line 15

Change `\thebibliography` to `\bibliography`.

page 79, line 16

Change "diplaying" to "displaying".

page 88, line 27

Change "entire the paragraph"to "the entire paragraph".

page 89, line 16

Change "page-breaking" to "line-breaking".

page 95, line 5

Replace "`{.01in}`" by "`{1.01in}`".

page 96

In the penultimate paragraph of Section 5.4.2, replace

> The `\vfill` command is an abbreviation for `\vspace{\fill}`.

with the following:

> The `\vfill` command is equivalent to a blank line followed by `\vspace{\fill}`.

page 98, line 6

Remove an "i" from "directiion".

page 102

In Figure 5.1, replace the two occurrences of "-1.8" by "-1.8".

page 104, line -3

Correct the spelling of "positioning".

page 113

Change the label on the arrow above Item 2 from `\itemsep` to `\itemsep + \parsep`.

page 116, line 20

Change "fourteen-point Plus Roman" to "twelve-point Plus Roman".

page 118, line -10

Change this line to:

```
... (myfile.tex [1] [2] [3] (part1.tex [4] [5]) (part2.tex [6] [7]
```

page 129

The following LaTeX warning messages should be listed:

> `No ... typeface in this size, using ...`
> A type style declaration specified a type style and size combination that is not available, so LaTeX is substituting another one.
>
> `... in math mode.`
> The indicated command is not permitted in math mode but was used there. Remember that `\boldmath`, `\unboldmath`, and size-changing commands may not be used in math mode.

pages 141–142

Change "von Beethoven" to "van Beethoven".

page 142

Add the following near the bottom of the page, just above the **Titles** heading.

> If an `author` or `editor` field has more names than you want to type, just end the list of names with `and others`; the standard styles convert this to the conventional *et al.*

page 147, line 6

Change "Scribe-compatible" to "*Scribe*-compatible".

page 152, line -6

Add `\newtheorem` and `\hyphenation` to the list of global declarations.

page 157, line −10

The first paragraph of Section C.3.1 should note that the `*`-form of a sectioning command does not affect the running head.

page 158, line −12

Change "chapters" to "appendix chapters".

page 160, top line

Change "(Section 5.6)" to "(Section 5.3)".

page 160, line −9

Change the description of the `openbib` style option to: "Causes the bibliography (Section 4.3) to be formatted in open style. (See van Leunen [7].)"

page 163, line 19

Change "Section 5.1.2" to "Section 5.1.1".

page 168, line −5

Replace "printed as `\␣`" by "printed as `␣`".

page 169, line −5

Change "first and third rows" to "first and third columns".

page 169, line −3

Add a period to the end of the sentence.

page 170

Add the following paragraph after line 5:

> An overfull `\hbox` warning occurs if a formula extends beyond the prevailing margins. However, if the formula does lie within the margins, no warning is generated even if it extends far enough to overprint the equation number.

page 174, line −1

Add the following sentence: "It is a global declaration."

page 176

Change the four lines immediately following the heading for Section C.8.1 to:

`\begin{figure}[`*loc*`]`	*body*	`\end{figure}`
`\begin{figure*}[`*loc*`]`	*body*	`\end{figure*}`
`\begin{table}[`*loc*`]`	*body*	`\end{table}`
`\begin{table*}[`*loc*`]`	*body*	`\end{table*}`

page 185, line -5

Replace "suppresses command" by "command suppresses".

page 187, lines 15–17

The sentence "It also writes *bib_files*…" is redundant and can be eliminated.

page 188, lines 1, 2, 4, 8

Change "*key_lst*" to "*key_list*".

page 191, line 13

The word "paragraph" misspelled.

page 191, line 14

Remove the space between `\begin` and `{sloppypar}`. (This is for consistency only; LaTeX ignores the space.)

page 199

Add the following sentence to the last paragraph on the page:

> Words typeset in typewriter style or in two different styles are not hyphenated except where permitted by `\-` commands.

(This is a change to LaTeX made on 18 December 1985.) Also, add the following index entry citations to this page: "`\-`", "hyphenation, suppressed", and "typewriter type style, no hyphenation in".

page 217

Add the subentry "`openbib`, 160" to the index entry "document-style option".

page 223, column 2, line 13

Change "mad" to "made".

page 225

Add page 47 to the index entry for "Leunen, Mary-Claire van".

page 228

In index entry for `\multicolumn`, change "194" to "184".

Tear-Out Command Sheet

In the first column, sixth line after "Sentences and Paragraphs" heading, replace "& `&`" by "& `\&`".

4.2 First Five Printings

page7, line 33

Add the following sentence after "[6]."

> (Many of the details of LaTeX, including command names, were also taken from *Scribe*.)

page 12, line −7

Replace "every" with "ever".

page 84

Add the following paragraph just after line 2.

> Some commands, such as `\chapter`, change the style of the current page. You can change it yourself with the `\thispagestyle` command.

Also, add the appropriate index entries for `\thispagestyle` and `\chapter`.

page 88, line 29

Change "its" to "it's".

page 91, line 5

It should be noted that in the `book` document style, `\chapter` uses `\cleardoublepage`.

page 111, line −4

Remove the extra `t` from "`withtout`".

page 122, line 17

Change the sentence that begins "The most probable cause is" to the following:

> The most probable cause is a list-making environment with no `\item` command.

Page 126, line 12ff

An un`\protect`ed command—even a robust one—in the argument of one of these commands can cause TEX to run out of this kind of space. It's a good idea to `\protect` all commands in these arguments.

Page 153, top of page

It should be noted that if the invisible "word" occurs at the end of a paragraph, not attached to a real word, then it could appear on a line by itself, producing a blank line in the output.

Page 160, line −7

Replace "`equations`" with "`equation`".

Page 162

In the description of `\pagenumbering`, it should be mentioned that the command sets the value of the `page` counter to 1.

Page 177, line 1

It should be noted that, in a two-column page style, a single-column figure can come before an earlier double-column figure, and vice-versa.

Page 177, line −1

Replace "page" with "text page".

Page 178, lines 1 and 8

Replace "page" with "text page".

page 183

The description of `\extracolsep` should mention that no extra space is put to the left of the first column.

page 213

Change the page reference for "`\bibitem`, moving argument of" from 153 to 152.

page 213

Change the first page reference for "`bbl` (bibliography) file" from 74 to 75.

Page 219, index entry for "figures"

Remove the "and" from the subentry for "output by `\end{document}`".

page 223, left column, line 2

Remove the page number "79" from the first subentry under `\index`.

page 228

Change the page reference for "`\multicolumn`" from 194 to 184.

page 228

Remove the extra "," from the index entries for `\o` and `\O`.